

Embedded Linux Conference Closing Game

Tim Bird

Principal Software Engineer, Sony Corporation

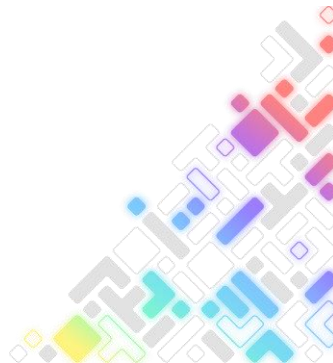
ELC Program Committee Chair

Thanks are due...

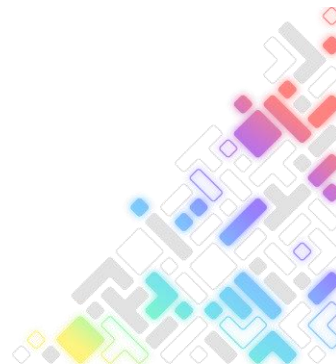
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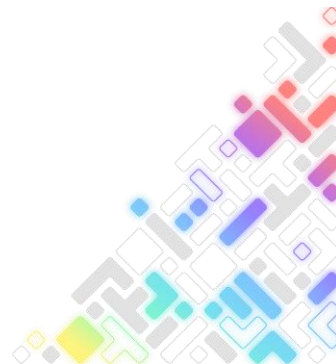
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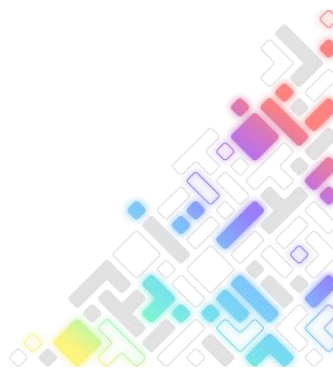
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Thanks are due...

Thanks to everyone who makes this event possible:

- Sponsors
- Program committee
 - Jeff Osier-Mixon, Thomas Petazzoni, Kate Stewart, Yoshitake Kobayashi,
 - Marta Rybczynska, Drew Fustini, Walt Miner, Tim Bird

Thanks are due...

Thanks to everyone who makes this event possible:

- Sponsors
- Program committee
- Speakers

Thanks are due...

Thanks to everyone who makes this event possible:

- Sponsors
- Program committee
- Speakers
- Attendees

Thanks are due...

Thanks to everyone who makes this event possible:

- Sponsors
- Program committee
- Speakers
- Attendees
- Linux Foundation Event Staff

Some Housekeeping

- Speakers – please submit PDF to sched.com site
 - Use “Manage session” on your session page
 - Or, email them to cfp@linuxfoundation.org
 - Don’t make us hunt you down!
- EOSS sessions were recorded
 - Will be on YouTube in 6 to 8 weeks

eLinux Presentations Page

- elinux.org Presentations page will soon be populated:
https://elinux.org/ELC_2024_Presentations
- We will put slides and links to videos when they are available

Future events

- mini-ELC at Open Source Summit Europe 2024!
 - September 16-17 in Vienna, Austria
 - Only 2 tracks on 2 days (smaller than usual)
 - CFP is open now! – deadline is April 30
 - ELC will NOT overlap Linux Plumbers Conference

We're going to play some games

- I like games where everyone has a chance to win
- Types:
 - Skill
 - Luck
- Basic outline:
 - We narrow the contestants down
 - The winners are selected and given a token
 - Start over with everyone re-joining

How to play

- Big overview (onsite):
 - Make sure you have cards (of different colors)
 - At the beginning of a round, everyone stands up
 - Hold up a card (or cards) to indicate your answer
 - If you are wrong, sit down
 - Eventually, the people who remain standing win a prize
 - Start over

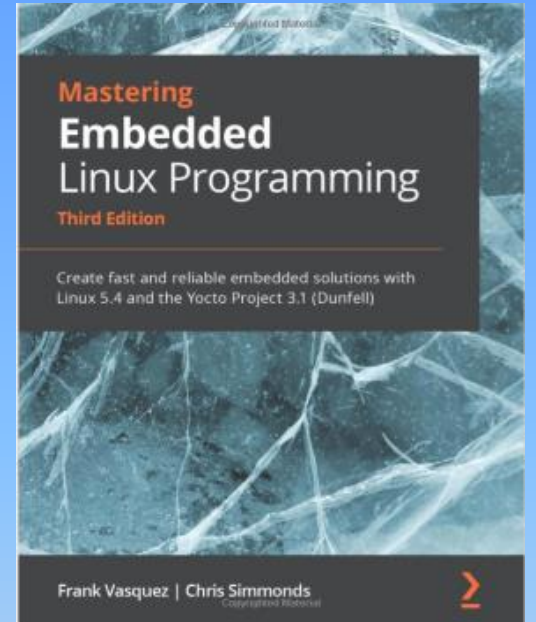
What is at stake? – Boards!!

- A BeagleV board
- A BeagleY-AI board
- 10 (!!)
- BeaglePlay boards
- With extra TI swag!!
- Donated by Texas Instruments and the BeagleBoard.org foundation.



What is at stake? – Books!!

- 4 Mastering Embedded Linux Programming
 - By Chris Simmonds



What is at stake? – More!!

- Gift cards!



- LWN.net subscriptions!



- Souvenirs from Seattle!



Seattle Swag and Candy



Our First Game

- Embedded Linux History, Technical, Nerd and Space Trivia

Our First Game

- Embedded Linux History, Technical, Nerd and Space Trivia

Important Disclaimer: This game is NOT fair.

Question - 1

The current released version of the kernel is:

- Green = 6.8
- Red = 6.9-rc4



Answer

- Green = 6.8

Release candidates don't count as releases. It says it right in the name, they are "candidates".

Source:

<https://kernel.org/>

Question - 2

Researchers recently demonstrated the ability to double the resolution of optical microscopes using what mechanism?

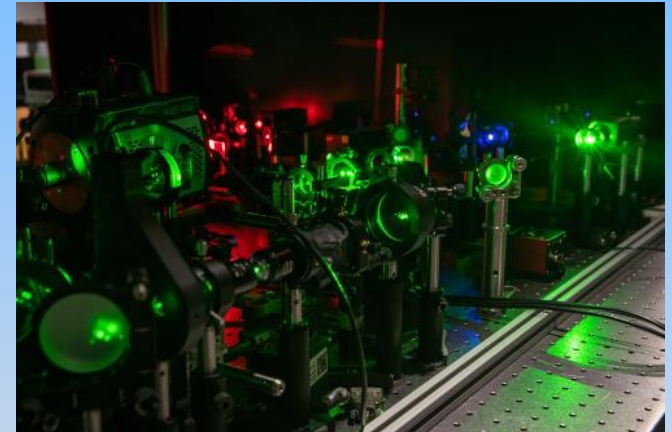
- Green = super sampling and AI
- Red = entangled photons



Answer

- Red = entangled photons

Entangled photons (known as biphotons) have an effective wavelength that is half of the wavelength of the individual photons (due to quantum effects), allowing for higher resolution of objects



Source: <https://www.caltech.edu/about/news/quantum-entanglement-of-photons-doubles-microscope-resolution>

But can it find my keys!

Question - 3

- What of the following tasks has been automated recently using AI, and is scheduled for deployment in June?
 - Green = Ordering fast food at a drive-through
 - Red = Loading dishes in a dishwasher

Answer

- Green: Ordering fast food at a drive-through

Wendy's has announced plans to deploy the first AI chatbot to take drive-through orders. It will be trained to decipher weird orders, and to try to upsell customers on additional food items.



Source: <https://www.pcmag.com/news/wendys-drive-through-orders-to-be-taken-by-a-chatbot>

We don't need no humans!

Question - 4

- The XZ backdoor security flaw was:
 - Green = Possible because XZ was open source
 - Red = Discovered because XZ was open source

Answer

- Green = Possible because XZ was open source
- Red = Discovered because XZ was open source

Both answers are correct. This involved a social engineering attack to get maintainer privileges, that would have been more difficult in a private icode base. But it also was found due to the openness of the code.

Source:

<https://gist.github.com/thesamesam/223949d5a074ebc3dce9ee78baad9e27>

Pithy quip goes here!

Question - 5

How many instances of Linux are running on Mars right now?

- Green = 0
- Red = 1
- Green and Red = 2

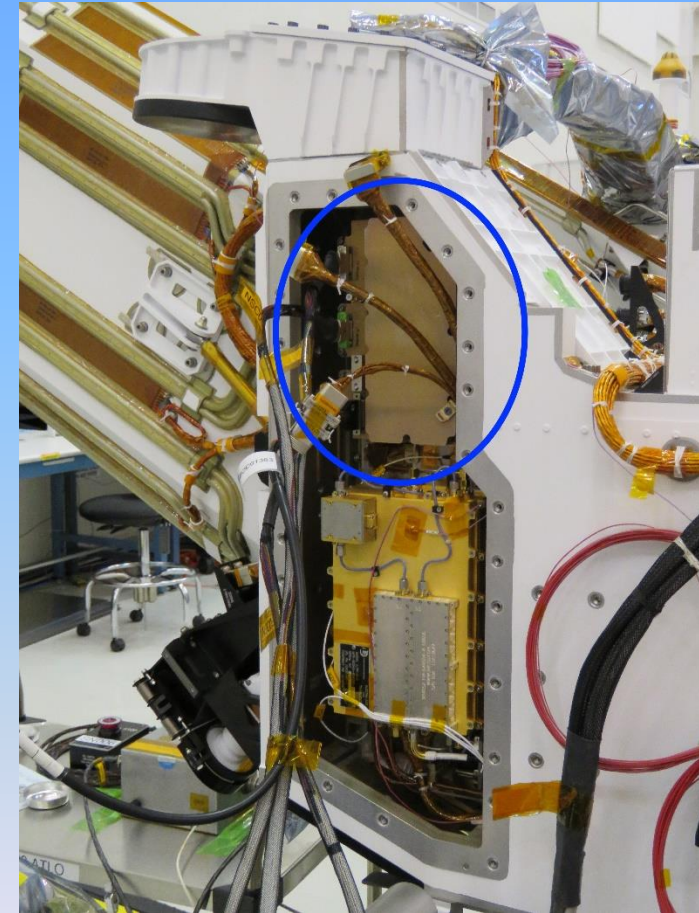


Answer

- Red = 1

The correct answer is 1, but probably not for the reason you are thinking. The Perseverance rover includes a zigbee base station running Linux, that NASA is considering re-purposing for other mission uses. Despite the end-of-mission for the helicopter, the base station is still operational on the rover (and is not subject to day-night power cycles). The helicopter avionics still boots every day, but it is currently night-time where the helicopter is, on Mars.

Source: <https://www.marsti.me/> and private communications with NASA



You could theoretically connect to the rover using Zigbee, if you can get close enough to it with your own craft!

Question - 6

The "most photographed" landmark in Seattle is:

- Green = the Space Needle
- Red = the pink elephant carwash sign



Answer

Red = the pink elephant carwash sign

What can I say? People love quirky things.

Source:

<https://postcardstoseattle/seattle-facts>



It does boast some impressive engineering!

Question - 7

How many developers were involved in the creation of the 6.9 (-rc4) kernel?

- Green = about 1000
- Red = about 2000



Answer

Red = about 2000

1928 unique e-mail addresses show up in git logs. There have consistently been about 2000 developers involved in each Linux release for the last several years.

Source: `author-stats v6.8.. | wc -l`

Pithy quip goes here!

Question - 8

What company recently demonstrated an "interactive" dress, that can change colors dynamically while being worn?

- Green = Zara
- Red = Adobe



Answer

- Red = Adobe

Adobe's project Primrose produced a dress that can change styles at the touch of a button, or can do animations, including dynamic changes based on sensing the movement of the wearer.



Source: <https://www.designboom.com/technology/project-primrose-adobe-interactive-dress-change-design-10-13-2023/>

Question - 9

Recently Linux was demonstrated running on a processor that cost:

- Green = about 70 cents
- Red = about 15 cents

Answer

- Red = about 15 cents



The processor used was a CH32V003 RISC-V microcontroller. It booted the kernel from an 8M SPI NOR, which had to be mapped using a RISC-V emulator, because the chip couldn't address it normally.

Source: <https://blog.adafruit.com/2024/02/19/linux-on-a-0-15-ch32v003-risc-v-microcontroller-riscv-linux/>

Using a RISC-V emulator on a RISC-V device is tight!

Question - 10

The LEV-2 Lunar nano-rover that operated briefly on the moon in January 2024, used the Linux OS

- Green = True
- Red = False



Answer

Red = False

Its mainboard computer was a Sony SPRESENSE board with only 1.5 MB of RAM, running the OSS NuttX operating system



Source: <https://www.sony.com/en/SonyInfo/blog/2024/03/07/>

We love all OSS OSes!

Question - 11

For the first time this year, Linus has hinted that he may retire soon.

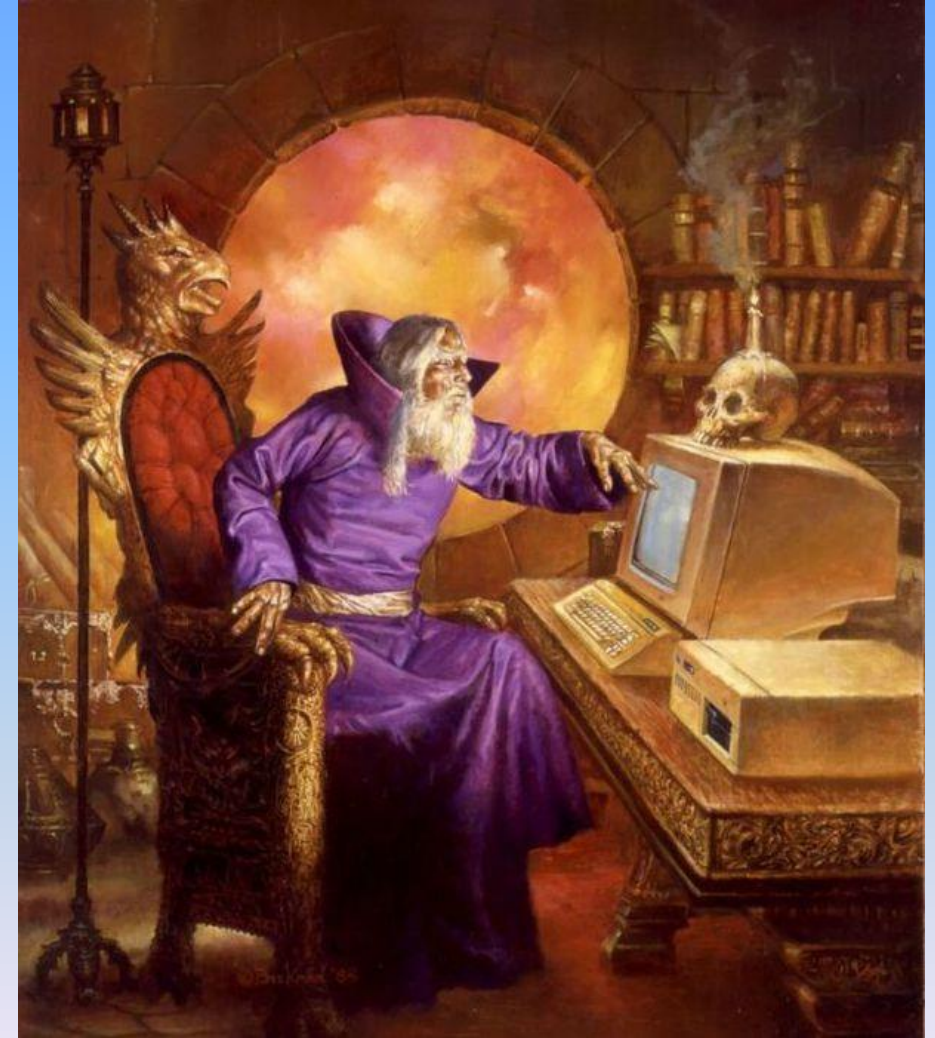
- Green = True
- Red = False



Answer

- Red = False

Linus has made no mention that he plans to retire any time soon (that I'm aware of).



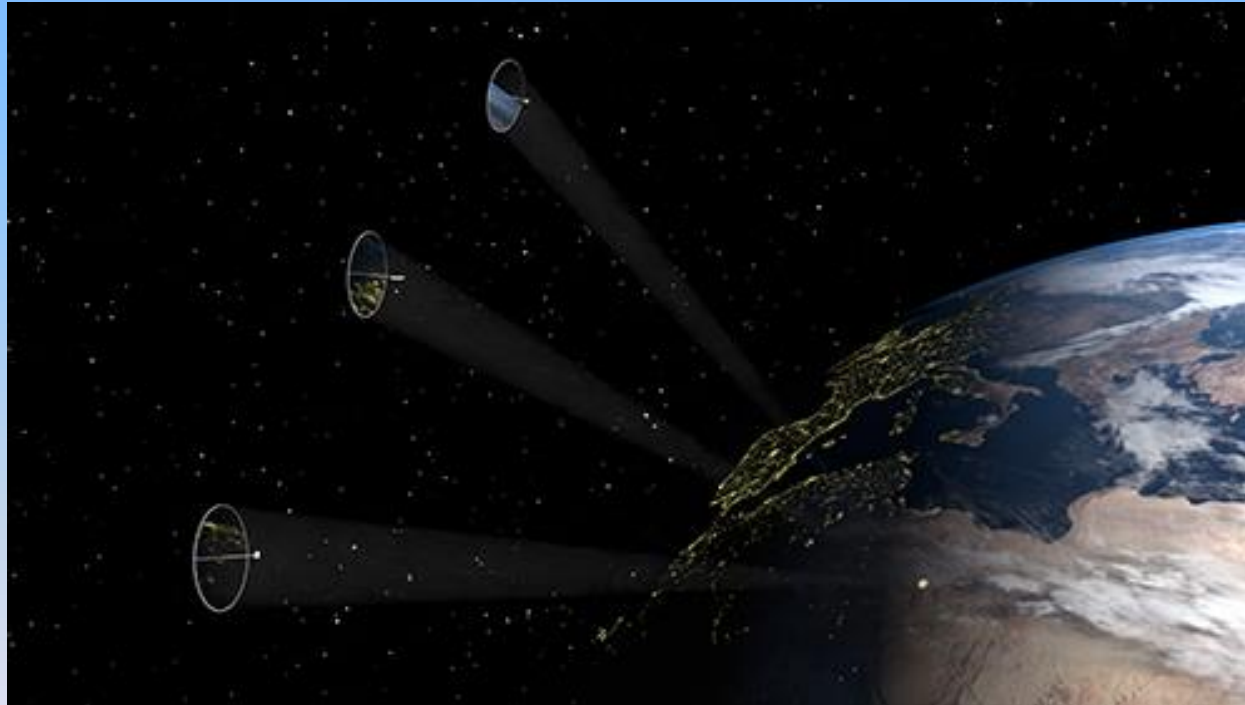
Actual picture of Linus at work

Question - 12

- University of Glasgow has received funding to study an innovative mechanism to improve the performance of solar installations by:
 - Green = using geo-engineering to decrease cloud cover over the array
 - Red = using orbiting mirrors to increase sunlight to the array

Answer

- Red = using orbiting mirrors to increase sunlight to the array



Source: <https://www.gla.ac.uk/explore/sustainability/research/solSPACE/>

Funders think it's a really bright idea!

Question - 13

Pike Place Market in Seattle is known for being:

- Green = the oldest continuously operating farmers market in the US
- Red = first farmers market on the US mainland to sell pineapples



Answer

- Green = the oldest continuously operating farmers market in the US

Pike Place Market opened in 1907, and has been running for over 115 years. (I have no idea who first imported fresh pineapple to the US.)

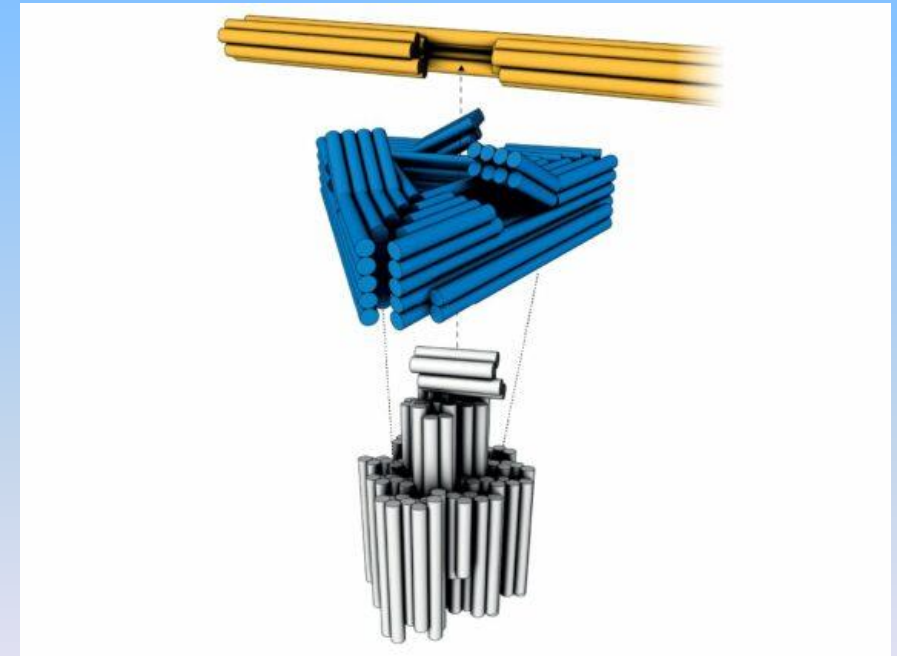
Source: <https://postcardstoseattle.com/seattle-facts/>

Pineapples are good though, especially on pizza!

Question - 14

Scientists have created the world's first working nanoscale electromotor. It was made using:

- Green = an atomic force microscope
- Red = folding DNA molecules



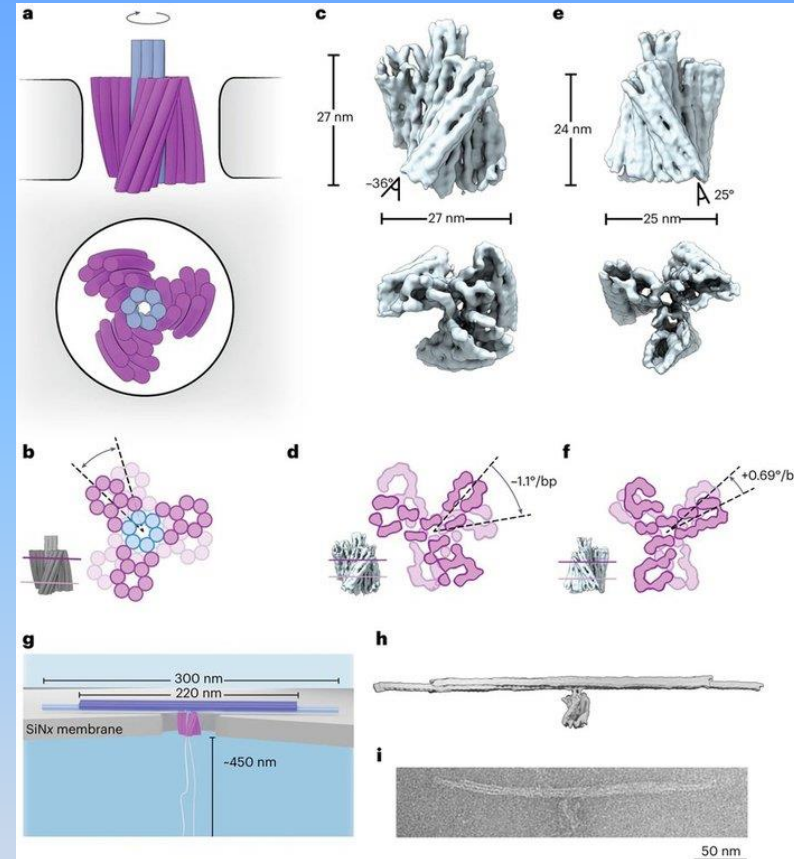
Answer

- Red = folding DNA molecules

The U of Texas team designed a turbine engineered from DNA that is powered by hydrodynamic flow inside a nanopore, a nanometer-sized hole in a membrane of solid-state silicon nitride.

Source: <https://tacc.utexas.edu/news/latest-news/2024/01/19/dna-origami-folded-into-tiny-motor/>

As one does, in these circumstances!



Question - 15

When was EOSS last held in Seattle?

- Green = 3 years ago
- Red = 8 years ago
- Green and Red = EOSS has never been held in Seattle

Answer

- **Green and Red** = EOSS has never been held in Seattle

ELC was last held in Seattle
in 2021 (3 years ago), but
ELC is not EOSS!

Embedded Linux Conference

The Embedded Linux Conference (ELC) is the premier vendor-neutral technical conference for companies and developers using Linux in embedded products.

The main organizer of ELC is the [Core Embedded Linux Project of the Linux Foundation](#)

Next Embedded Linux Conferences

Please note that the current plan is for these to be "hybrid" events. Both attendees and speakers may attend the event either in person or virtually. See the linked conference site for more information and for the CFP:

- Embedded Linux Conference 2024
 - Part of [Embedded Open Source Summit 2024](#)
 - Seattle, Washington, USA - April 16-18, 2024
 - Mini-Embedded Linux Conference Europe 2024
 - Part of [Open Source Summit Europe 2024](#)
 - Vienna, Austria - September 16-18, 2024
- NOTE: mini-ELC will be on September 16 and 17 only*

Previous Embedded Linux Conferences

Here are links to previous individual conference web sites:

- [ELC 2023](#) - Prague, Czech Republic - June 27-30, 2023
- [ELC Europe 2022](#) - Dublin, Ireland AND virtual - September 14-16, 2022
- [ELC 2022](#) - Austin, Texas, USA AND virtual - June 21-24, 2022
- [ELC 2021](#) - Seattle, USA AND virtual - September 27-30, 2021
- [ELC Europe 2020](#) - Virtual Experience, October 26 - 29, 2020
- [ELC 2020](#) - Virtual Experience, June 29 - July 2, 2020
- [ELC Europe 2019](#) - Lyon, France, October 28 - 30, 2019
- [ELC 2019](#) - San Diego, California, August 21 - 23, 2019

Question - 16

More than half of all operating spacecraft in the known universe run Linux

- Green = True
- Red = False



Answer

- Green = True

Total number of currently operating spacecraft is <10,000 (about 9700). Starlink and Planet Labs constellations of satellites are about 5900 craft.

Source: <https://in-the-sky.org/>

One OS to rule them all, and in outer space bind them!

Question - 17

True or False: Research indicates that AI-generated code gets reverted more often from projects where it has been introduced.

- Green = True
- Red = False



Answer

- Green = True



AI-generated code (like by co-pilot) seems to be reverted more often, and needs to be checked more thoroughly.

"The bottom line is that 'using Copilot' is strongly correlated with 'mistake code' being pushed to the repo." according to one recent study.

Source: <https://visualstudiomagazine.com/articles/2024/01/25/copilot-research.aspx>

Does this surprise anyone?

Question - 18

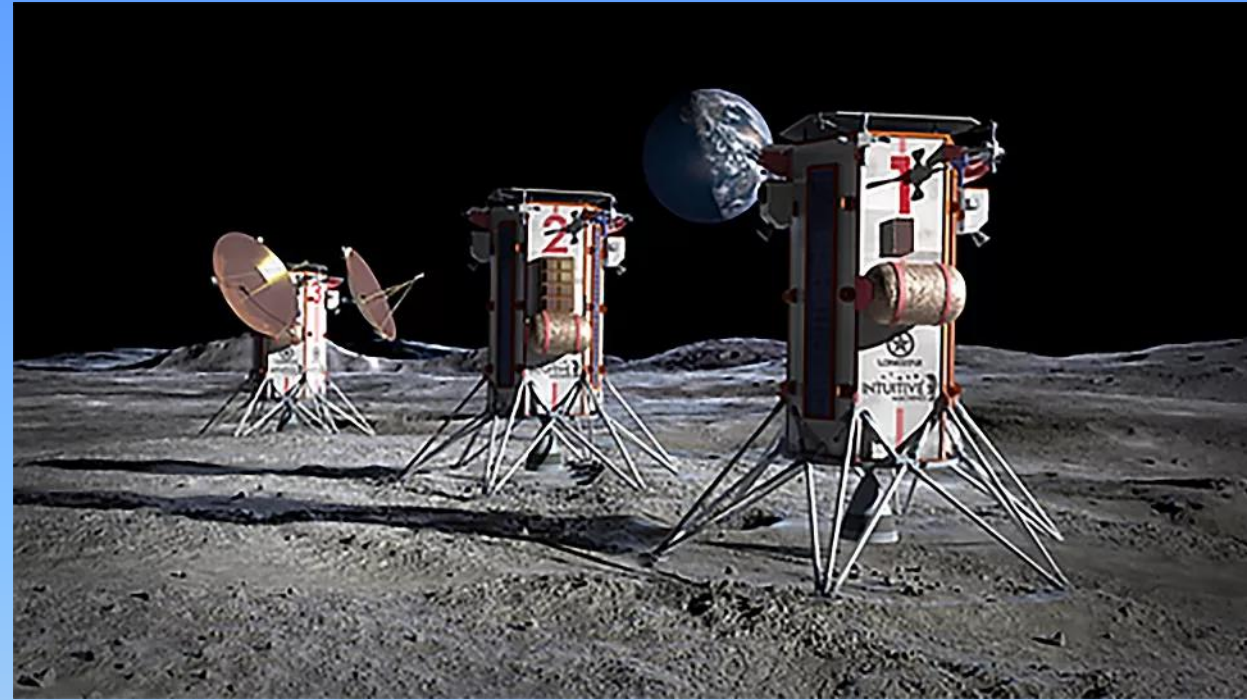
A Tech startup recently announced plans to build a data center where?

- Green = On the moon
- Red = At the bottom of the ocean

Answer

- Green = On the moon

Lonestar Data Holdings delivered prototype hardware to the moon earlier this year, and plans to ship a working data center later this year.



Sources:

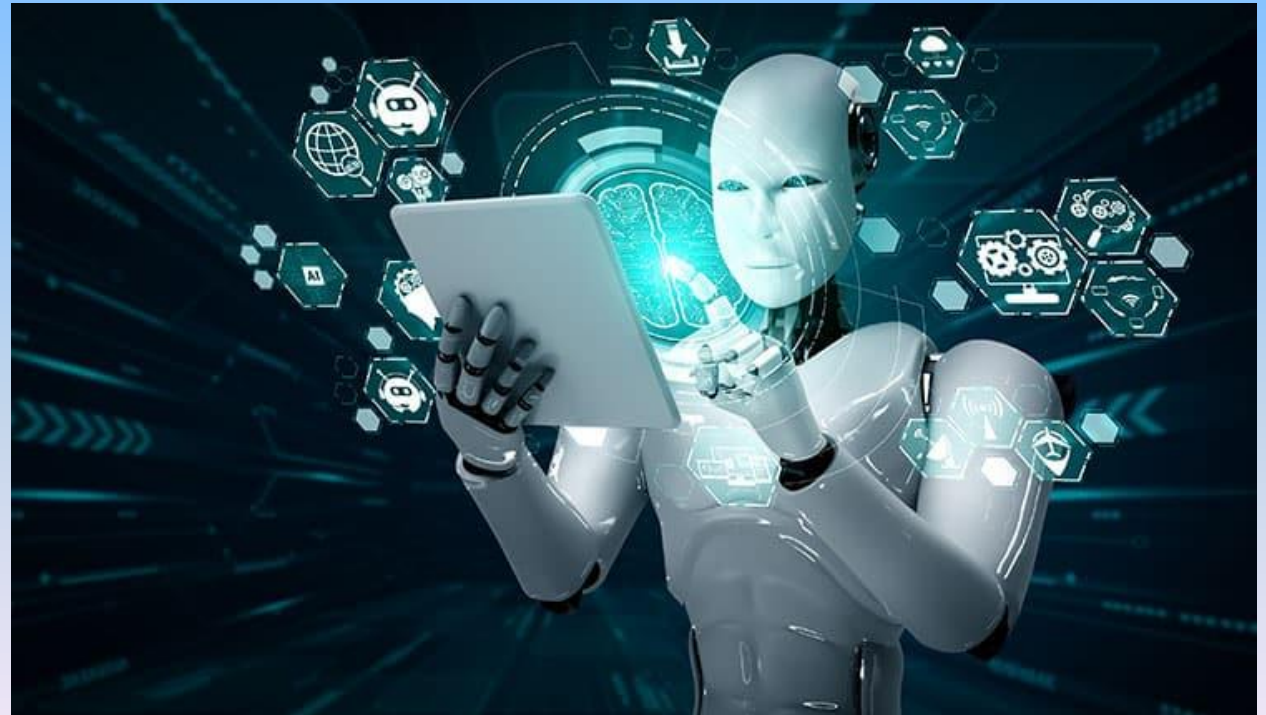
- <https://gizmodo.com/startup-moves-closer-building-data-centers-moon-1850192177>
- <https://www.lonestarlunar.com/missions>

Physical security is very high there!

Question - 19

An AI chip was announced recently that will have a large number of transistor elements. How many?

- Green = 4 trillion
- Red = 100 billion



Answer

Green = 4 trillion (!!!)



California-based Cerebras Systems has unveiled the Wafer Scale Engine (WSE-3), its latest artificial intelligence (AI) chip with a whopping four trillion transistors. It is trying to beat the performance of Nvidia's top AI processor (with 80 billion transistors), by 57 times.

Source: <https://interestingengineering.com/innovation/worlds-fastest-ai-chip-wse-3>

That's more transistors than you can shake a stick at!

Question - 20

The official nickname for Seattle is:

- Green = the Emerald City
- Red = the Queen City
- Green and Red = the Rain City



Answer

Green = the Emerald City

Seattle did have the nickname "Queen City" for a number of years, but it's not the official nickname. And regarding rain, it actually rains less in Seattle than most people think. It only gets about 38 inches of rain a year (though it is overcast a lot).

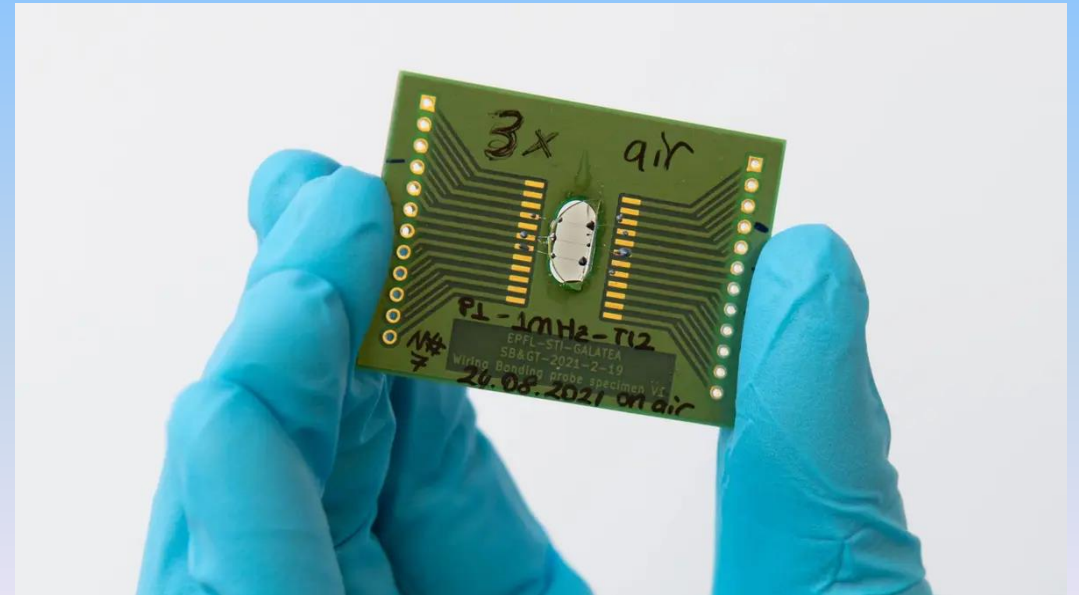
Source: <https://postcardtoseattle.com/seattle-facts/>

Seattle is green because of the rain – makes sense!

Question - 21

- The first transparent semi-conductor was created in the last year, using a laser on a glass substrate.

- Green = True
- Red = False



Answer

- Red = False



Transparent semiconductors have been around since at least 2015. However, a new method of creating electricity-creating semi-conductors was discovered using tellurite glass and a femto-second laser.

Source: <https://interestingengineering.com/innovation/scientist-turn-glass-into-a-transparent-semiconductor-with-laser>

Don't worry, we'll get our transparent phones soon enough!

Question - 22

- BusyBox was initially created for MMU-less systems (uClinux)
- Green = True
- Red = False



Answer

- Red: False

BusyBox was created for Debian boot floppies



Floppies were smaller back then (and existed), so this was a valid use case!

Question - 23

The cell phone in your pocket has more computing power than the Apollo 11 mission that traveled to the moon and back, including onboard and ground control computers.

- Green = True
- Red = False



Answer

- Green: True

The Apollo guidance computer was little more than a pocket calculator.

The ground-based system was an IBM System/360 Model 75 which clocked in at about 1.2 MIPS

Note that Intel's 8086 processor wasn't released until a decade *after* Apollo 11.

We can send a person to the moon, but I can't order a pizza with my phone!

Question - 24

What percentage of Linux kernel developers are first-time contributors, each kernel release?

- Green = 2%
- Red = 12%

Answer

Red = 12%

According to data from LWN.net, there are about 250 new developers in each kernel release, out of the 2000 or so total developer count.

Source: <https://lwn.net/Articles/941675/>

You too can be a kernel developer!

Question - 25

A research group announced a processor that could be produced for less than 1 penny per chip. What was their breakthrough?

- Green = the chip was made of plastic
- Red = they reduced the gate count to just over 2000 transistors

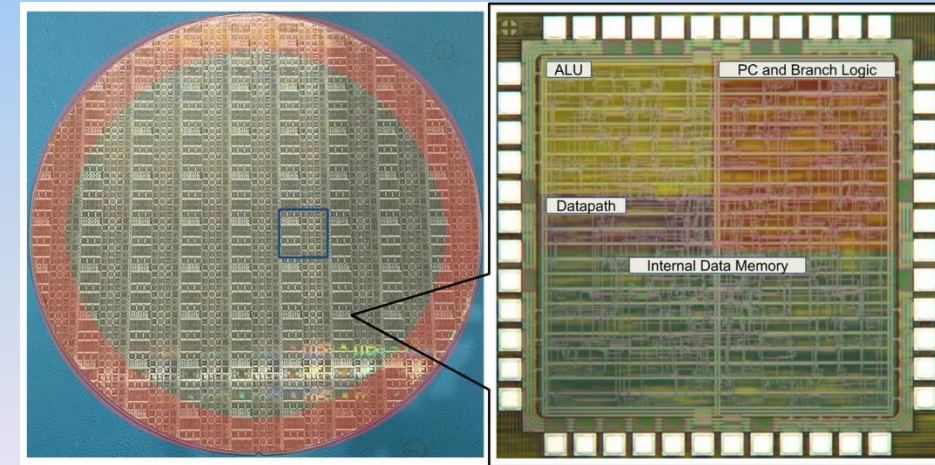
Answer

- Red = They reduced the gate count to just over 2000 transistors

They got rid of pipelines, used 4-bit logic, and re-used blocks of gates for multiple purposes. The substrate was plastic, so the device was flexible, but there have been plastic-based chips before. This is the first one with sufficient yield to potentially break the 1-cent per chip barrier. The final transistor count was 2104.

Source:

- <https://spectrum.ieee.org/plastic-microprocessor>



No word yet on when they will finish porting Linux to the processor.

Question - 26

What is the average airspeed velocity of an unladen swallow?

- Green = 11 meters per second (or 24 MPH)
- Red = “African or European?”



Answer

- Green or Red

Both answers are acceptable!

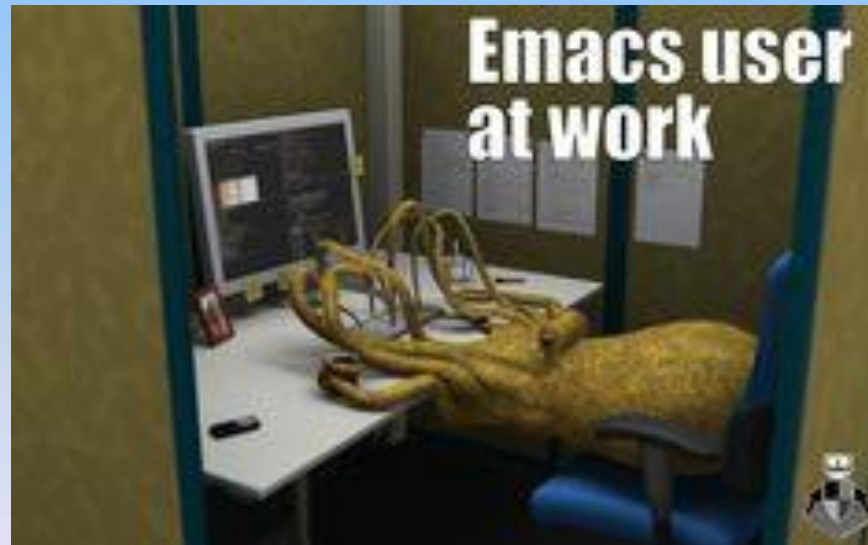
To trick the bridge-keeper, you may respond with a question instead of an answer

Source for speed: <http://style.org/unladenswallow/>

Question - 27

According to the Debian popularity contest, what text editor is more popular:

- Green = Vim
- Red = Emacs
- Green and Red = Nano

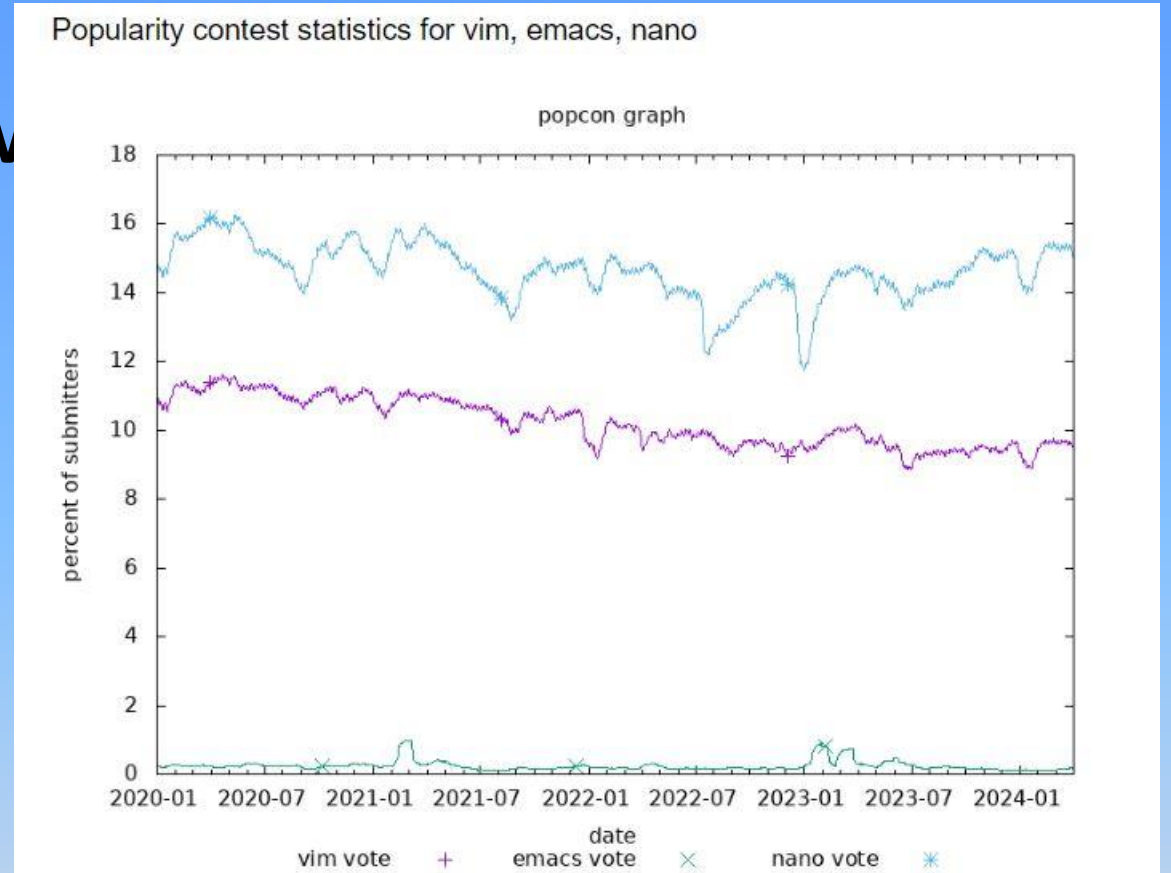


Answer

Green and Red = Nano

This is the first time I've seen VIM displaced in this chart.

Source: http://qa.debian.org/popcon-graph.php?packages=vim%2C+emacs%2C+gedit%2C+kate%2C+nano&show_vote=on&want_percent=on&want_legend=on&from_date=2010-01-01&to_date=2013-10-10&hlight_date=&date_fmt=%25Y-%25m&beenhere=1



Question - 28

Linus Torvalds has actually been bitten by a penguin

- Green = True
- Red = False



Answer

- Green: True

At a zoo in Canberra Australia, Linus was bitten (mildly) by a fairy penguin.

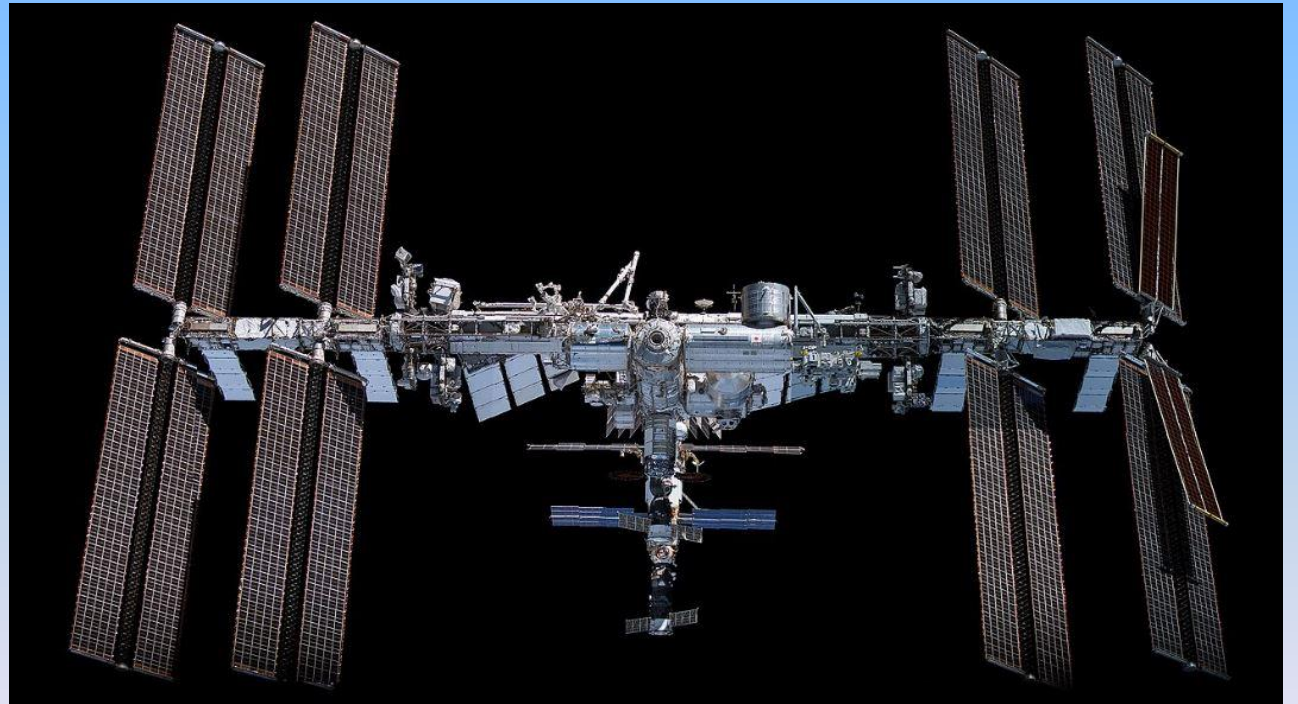
Source: [https://en.wikipedia.org/wiki/Tux_\(mascot\)](https://en.wikipedia.org/wiki/Tux_(mascot))



Question - 29

There are now how many processors running Linux in low earth orbit?

- Green = about 6,400
- Red = about 400,000



Answer

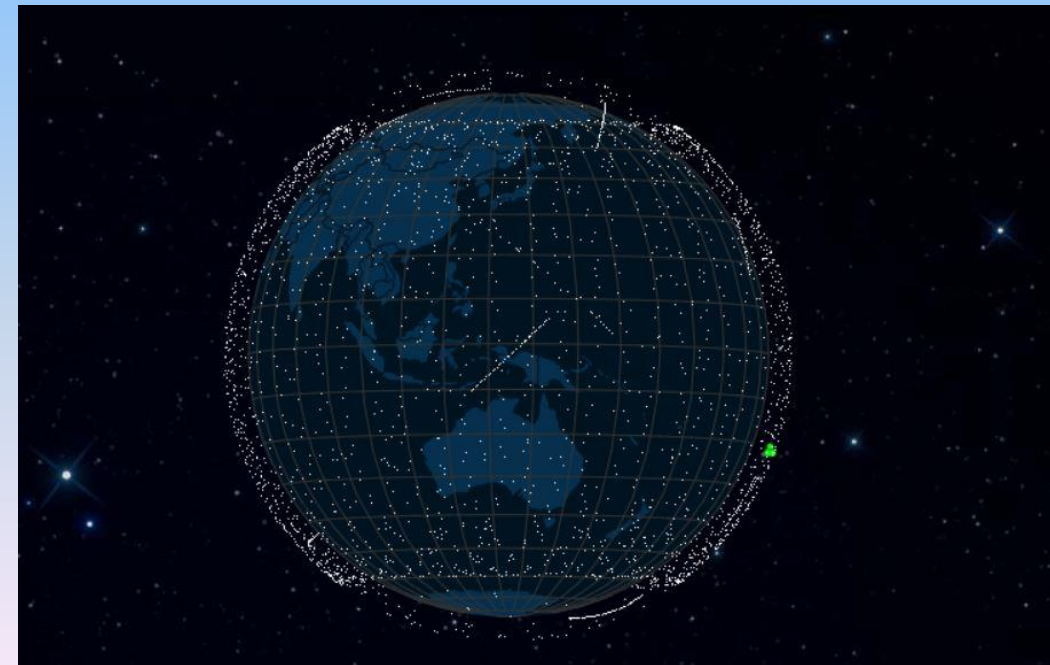
- Red = 400,000

Each StarLink satellite uses between 66 and 85 Linux processors, and there are now over 5000 in orbit.

Source:

<https://satellitemap.space/?constellation=starlink>

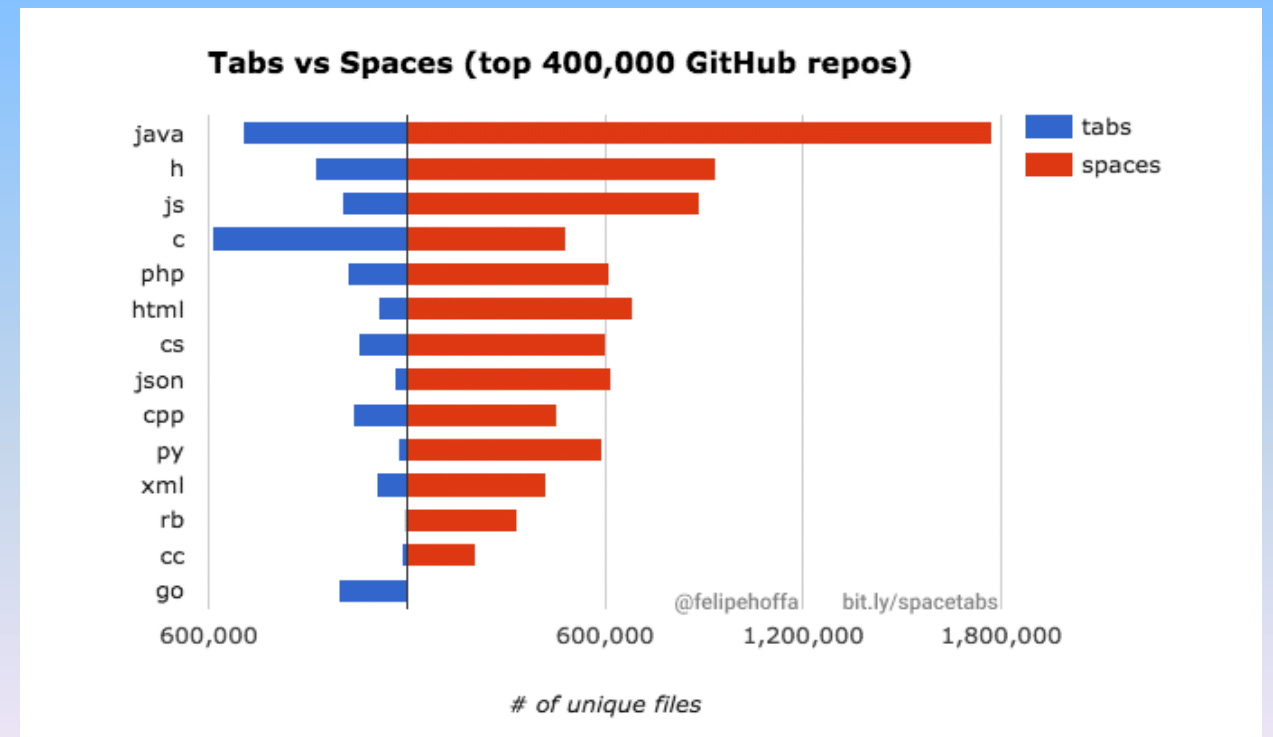
Elon Musk should rename the constellation to "SkyNet" when it hits 1 million processors!!



Question - 30

Linus Torvalds prefers to do indentation using:

- Green = Tabs
- Red = Spaces
- Green and Red =
Mixed Tabs and Spaces



Answer

Tab ->

Space ->

- Green = Tabs

Linus recently posted a patch to change some spaces to tabs, to "encourage" kconfig parsing tools to handle whitespace better.

Source: <https://arstechnica.com/gadgets/2024/04/linus-torvalds-reiterates-his-tabs-versus-spaces-stance-with-a-kernel-trap/>

!
(remark written with spaces and tabs)

Question - 31

Linus first got into kernel development because:

- Green = He was trying to impress his future wife
- Red = He likes understanding the working of the computer hardware

Answer

Red = He likes understanding the working of the computer hardware

Source: Linus and Dirk fireside chat this week



Stay curious, kids!

Question - 32

The ARM1 processor was released in what year?

- Green = 1985
- Red = 1989

Answer

- Green: 1985

Question - 33

The first long distance remote operation of a computer, was of a computer at Bell Labs in New York, by a teletypewriter in New Hampshire. Did this happen earlier or later than 1953?

- Green = Earlier
- Red = Later



Answer

- Green: Earlier

The year this happened was 1940.

Source:

<http://www.nytimes.com/imagepages/2012/02/26/sunday-review/26bell-gfx.html?ref=sunday>

Question - 34

Version 0.11 of Linux could be run in as little as X MB of RAM, where X is:

- Green = 4MB
- Red = 2MB

Answer

- Red: 2MB

Source: <https://digital-domain.net/lug/unix-linux-history.html>

Question - 35

- In the famous 2003 IBM "His Name Is Linux" tv commercial, the young blond boy who is absorbing the world's knowledge spoke only two sentences.

- Green = True
- Red = False



Answer

- Red: False

The blond boy did not say a single word.



<https://www.youtube.com/watch?v=x7ozaFbqg00>

Question - 35

Which of these companies paid a busybox maintainer as a company employee?

- Green = MontaVista
- Red = Lineo

Answer -

- Red = Lineo

Eric Andersen was maintainer of busybox from 1999 to 2006. He was an employee of Lineo for the first part of this time period.

Question - 36

- ELC has been held more than 20 times.
- Green = True
- Red = False



Answer

- Green: True

ELC has been held 34 times: 18 times in North America and 16 times in Europe.

Question - 37

The term "open source" was invented by Eric S. Raymond in 1998.

- Green: True
- Red: False

Answer:

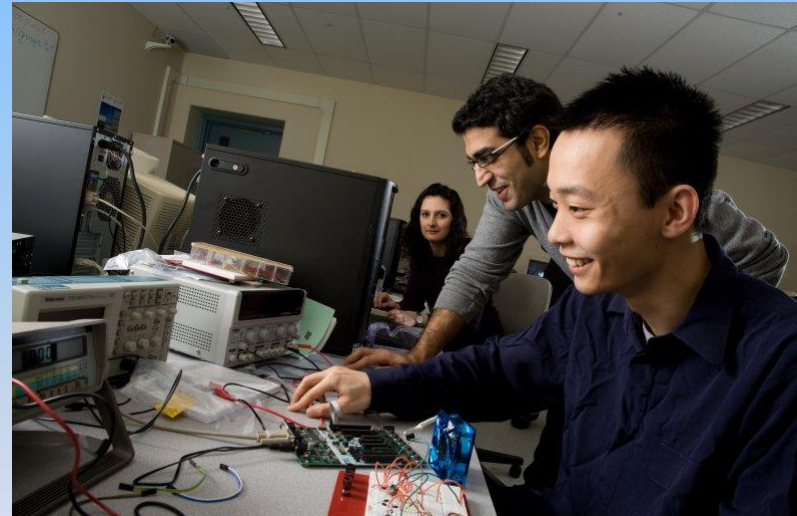
- Red: False.

The term was suggested by Christine Peterson at a strategy session of interested parties held in Palo Alto in 1998 to discuss the ramifications of Netscape's source code release of their Navigator browser. ESR worked very hard to popularize the term.

Question - 38

There are 100,000 developers using embedded Linux worldwide.

- Green: Higher
- Red: Lower



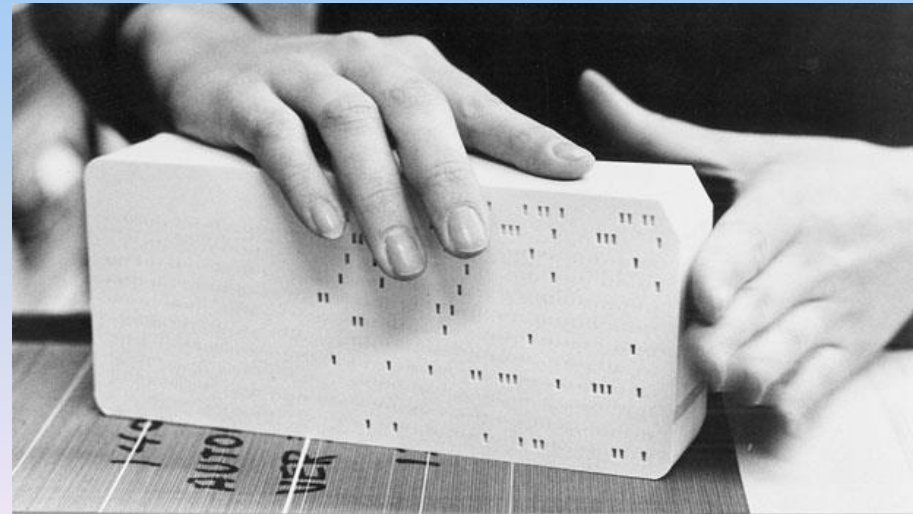
Answer

- Green: Higher

Estimates range from 250,000 to over 1M.

Question - 39

- Punched cards were the "printer ink" of the mid-1950's for IBM. In this time period, the percent of IBM's profits that derived from punched card sales was greater than or less than 25%?
 - Green = Greater
 - Red = Less than



Answer

- Green: Greater than 25%

30%

[http://www-](http://www-03.ibm.com/ibm/history/ibm100/us/en/icons/punchcard/)

[03.ibm.com/ibm/history/ibm100/us/en/icons/punchcard/](http://www-03.ibm.com/ibm/history/ibm100/us/en/icons/punchcard/)



Question - XX

- Question goes here
- Green = first answer
- Red = second answer

Answer

- Green: first answer
- Red = second answer

Description of answer

Source: ...

Pithy quip goes here!

Game 1 over
Time for Game 2

Our Second Game

- Rock, Paper, Scissors - against this presentation

Our Second Game

- Rock, Paper, Scissors

Rock, Paper and Scissors



Picture by Kittikun Atsawintarangkul

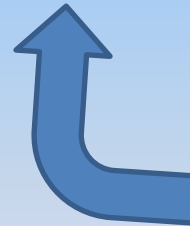
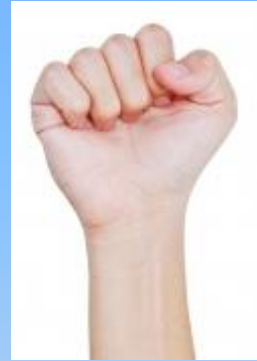
Our Second Game

- Rock, Paper, Scissors - against the presenter

Rules

- Rock beats scissors
- Scissors cuts paper
- Paper covers rock

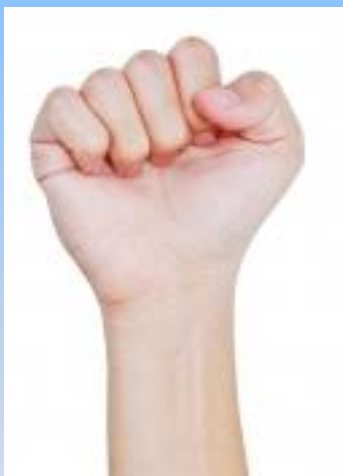
If you beat the presenter
you stay in the game.



Ready, Set,...

Round 1

Presenter is:



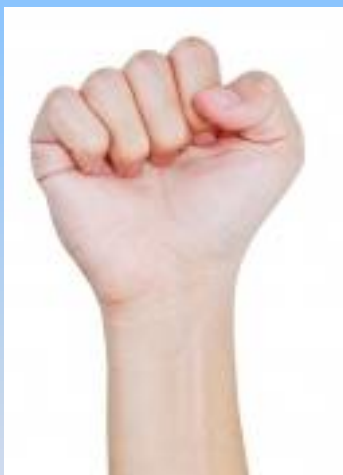
Stay in game if you are:



Ready, Set,...

Round 2

Presenter is:



Stay in game if you are:



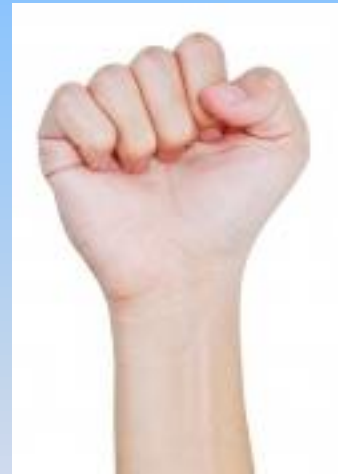
Ready, Set,...

Round 3

Presenter is:



Stay in game if you are:



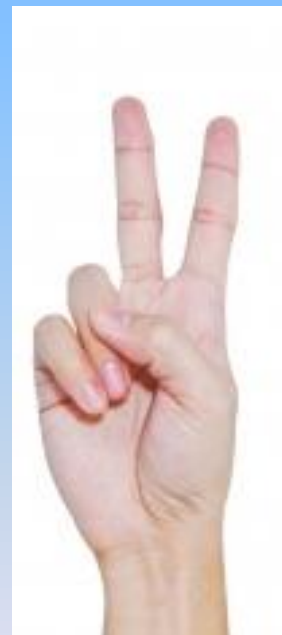
Ready, Set,...

Round 4

Presenter is:



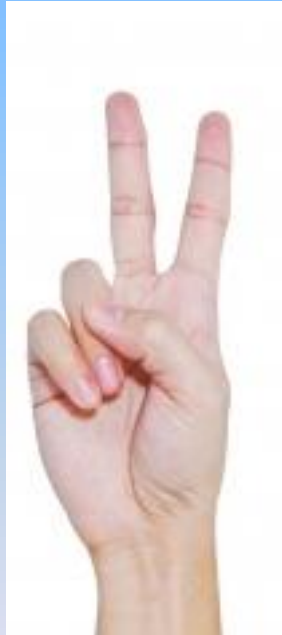
Stay in game if you are:



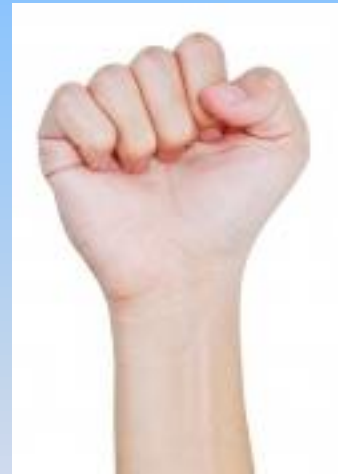
Ready, Set,...

Round 5

Presenter is:



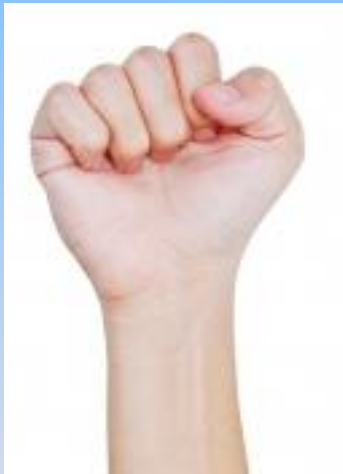
Stay in game if you are:



Ready, Set,...

Round 6

Presenter is:



Stay in game if you are:



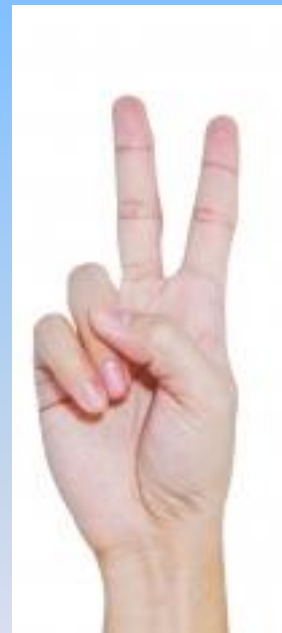
Ready, Set,...

Round 7

Presenter is:



Stay in game if you are:



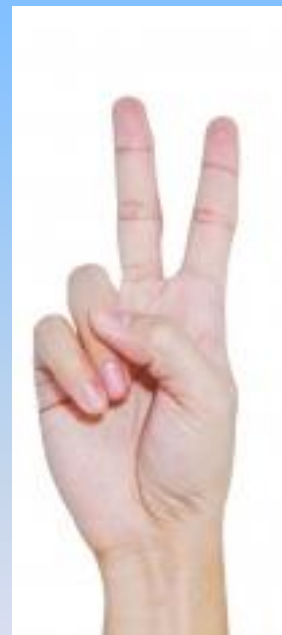
Ready, Set,...

Round 8

Presenter is:



Stay in game if you are:



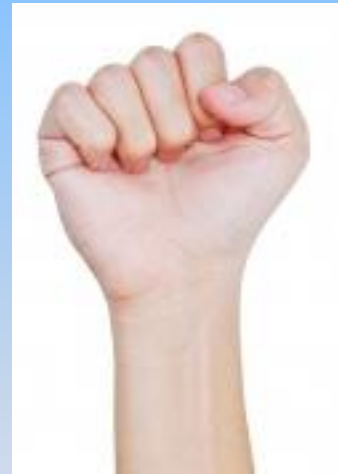
Ready, Set,...

Round 9

Presenter is:



Stay in game if you are:



Ready, Set,...

Round 10

Presenter is:



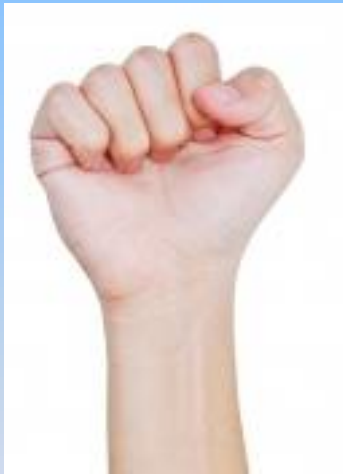
Stay in game if you are:



Ready, Set,...

Round 11

Presenter is:



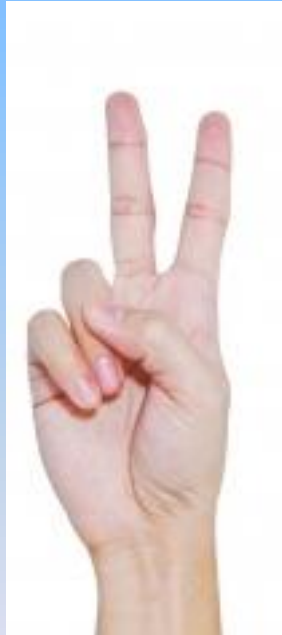
Stay in game if you are:



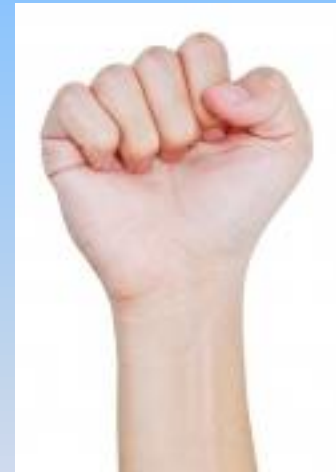
Ready, Set,...

Round 12

Presenter is:



Stay in game if you are:



Ready, Set,...

Round 13

Presenter is:



Stay in game if you are:



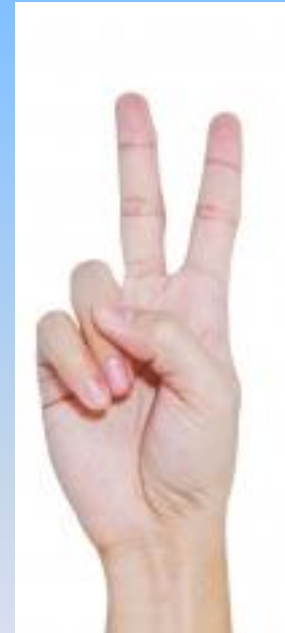
Ready, Set,...

Round 14

Presenter is:



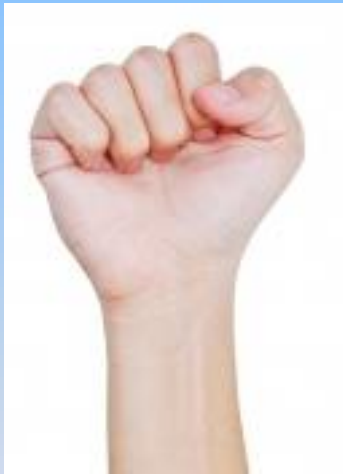
Stay in game if you are:



Ready, Set,...

Round 15

Presenter is:



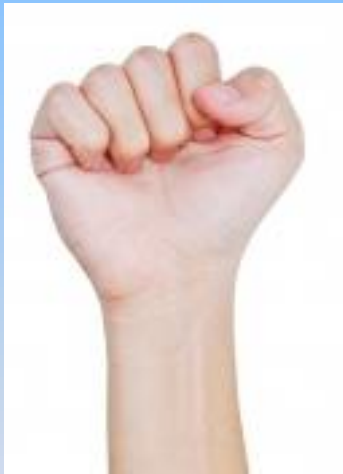
Stay in game if you are:



Ready, Set,...

Round 16

Presenter is:



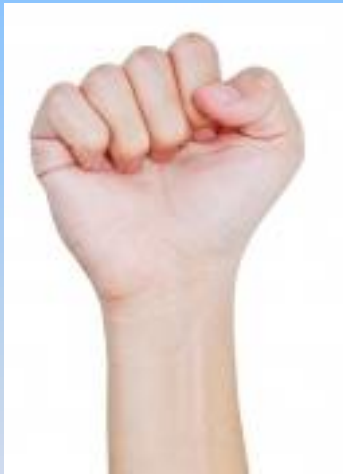
Stay in game if you are:



Ready, Set,...

Round 17

Presenter is:



Stay in game if you are:



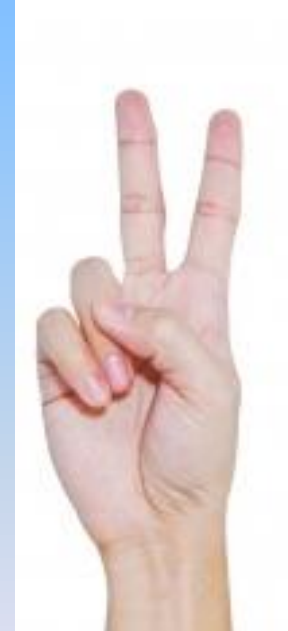
Ready, Set,...

Round 18

Presenter is:



Stay in game if you are:



Ready, Set,...

Round 19

Presenter is:



Stay in game if you are:



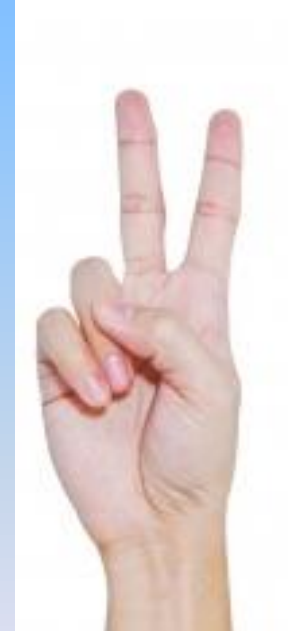
Ready, Set,...

Round 20

Presenter is:



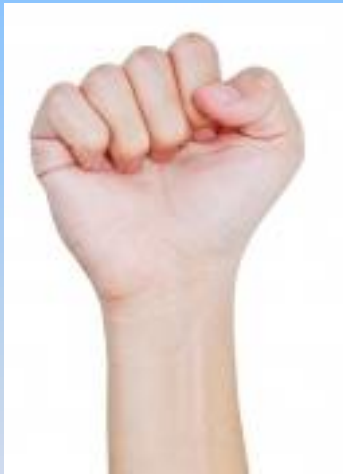
Stay in game if you are:



Ready, Set,...

Round 21

Presenter is:



Stay in game if you are:



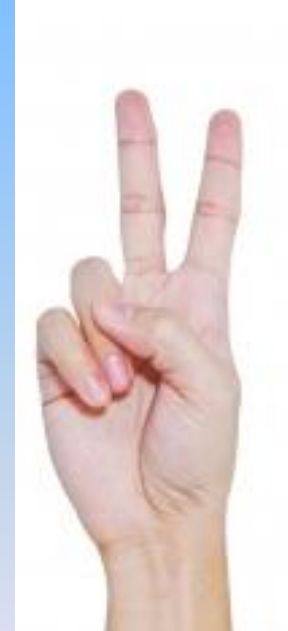
Ready, Set,...

Round 22

Presenter is:



Stay in game if you are:



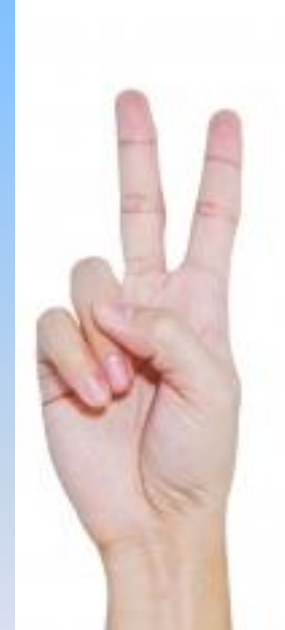
Ready, Set,...

Round 23

Presenter is:



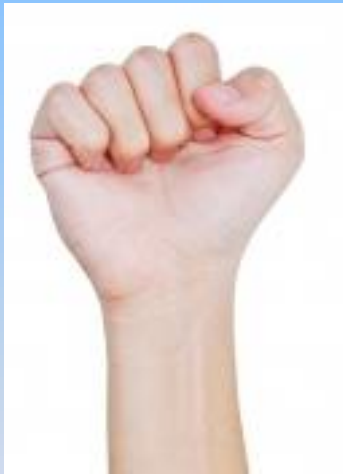
Stay in game if you are:



Ready, Set,...

Round 24

Presenter is:



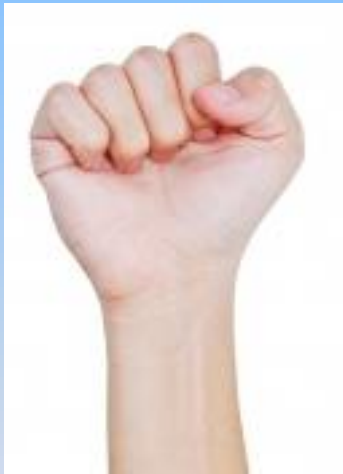
Stay in game if you are:



Ready, Set,...

Round 25

Presenter is:



Stay in game if you are:



Game 2 over
Time for a closing thought...

Final thought

- Do something in an OSS project



Final thought

- Do something in an OSS project
 - almost anything helps



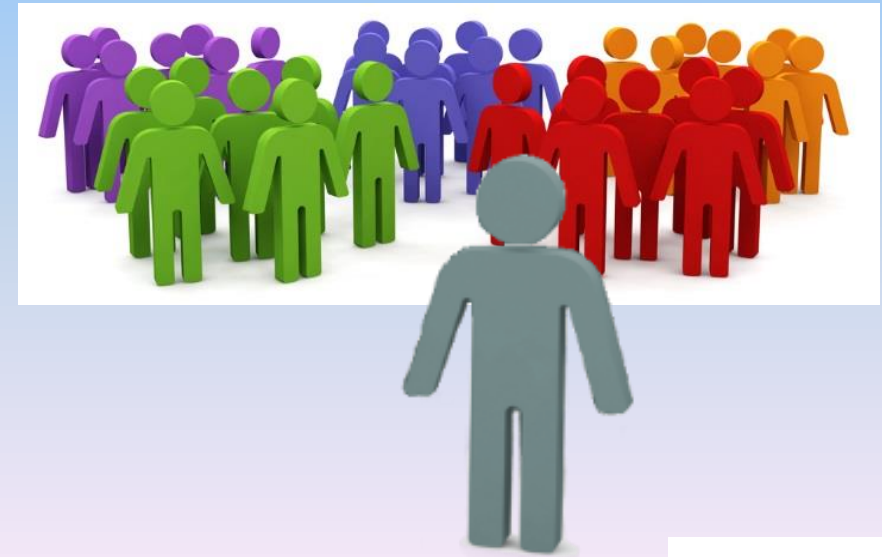
Final thought

- Do something in an OSS project
 - almost anything helps
- Don't wait to join a community



Final thought

- Do something in an OSS project
 - almost anything helps
- Don't wait to join a community
- The first contribution is the hardest



Final thought

- Do something – almost anything helps
- Don't wait to join a community
- The first contribution is the hardest
- The 'xz backdoor' came about due, partially, to not enough people helping an overwhelmed maintainer



Final thought

- Do something – almost anything helps
- Don't wait to join a community
- The first contribution is the hardest
- The 'xz backdoor' came about due, partially, to not enough people helping an overwhelmed maintainer
- Your contribution can make a difference!!



Final thought

- Share your enthusiasm!



The future is bright!



***Thanks for joining
ELC this year!***

**I hope you learned something new,
and had a good time.**

I hope to see you all next year!